

AVOX Systems Inc.

AIRCRAFT SYSTEMS
Oxygen Systems



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WORKMANSHIP STANDARDS GUIDELINE


Prepared By: _____
Edward Gloss, Engineering, GA/BJ


Approved By: _____
Frank Dorogi, Engineering Program Manager, GA/BJ

PROPRIETARY

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225 Erie Street
Lancaster, NY 14086-9502, USA
716-683-5100

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Record of Revisions

REV	DATE	EFFECT ON		REASON FOR REVISION	Initial
		PAGE	PARAGRAPH		
-	2/11/2010	All	-	Initial Release	EJG
A	4/13/2010	20 - 34	10	Added textiles	KW
	4/14/2010	14	5.4	Added drilled hole section	EJG
B	8/14/2012	11	4.1.17	Added Key Characteristics	DRE
C	04/22/2014	15 37 37 15	5.5 12 11 5.3.5	Added section 5.5 HEX. Added section 12 for painted/powder coating. Added section 11 for castings and forgings. Updated graphic for ANPT threads	EJG
D	05/20/2015	6-12 38 38	3.1.1 11 12	Clarified acceptability criteria for burrs. Revised section 11 for castings and forgings. Added section 12 for springs	RG/EJG
E	1/7/2016	22	9	Added examples of packaging to each code for clarification (taken from QAP 22)	AR/EJG
F	5/16/2018	47	14	Added section 14 Chrome Plating	EJG

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1 GENERAL

1.1 Scope

This specification establishes a workmanship standard to bring clarity to characteristics that are normally evaluated subjectively, i.e. (burrs, surface finish, plating, cleanliness, etc) and to standardize AVOX's approach to Product Quality. Ref. QAF76/S_0002W QA.

1.2 Purpose

This purpose of this document is to provide clear guidelines about when to apply this standard, rules about how to specify the standard, and clarification of the terminology.

The intent of this specification is to establish accept/reject criteria for all items supplied to AVOX and/or manufactured by AVOX for use in AVOX-ZODIAC AEROSPACE applications based on the design requirements and drawing specifications.

1.3 Standards and Specifications

1.3.1 Design Specifications

Design requirements are expected to describe the complete requirements of the part or assembly, both functionally and aesthetically. The drawing visually or textually must describe the final requirements

1.3.2 Inspection Specifications and Practices

Inspections standards must define explicitly how the part or assembly is inspected for presence (or absence) of burrs, edge finish, and overall quality. Inspection standards or specifications ensure that both the intent of the drawing and company policy are achieved.

2 REFERENCE DOCUMENTS

2.1 AVOX Documents

2.1.1 Component and Assembly Drawings

2.1.2 Acceptance Test Procedures (ATP)

2.1.3 Purchase Order

2.1.4 Manufacturing Operations Sheets

2.1.5 AVOX SMP 7600001 Standard Manufacturing Process Rubber Molding

2.2 Document Hierarchy

This document supplements the engineering drawings and purchase order requirements. In the event of conflict, purchase order requirements and engineering drawings shall take precedence.

2.3 General documents

- 2.3.1 ASME Y14.100 Engineering Drawing Practices (2004).
- 2.3.2 ASME Y14.5M Dimensioning and Tolerancing (1994, R 2004).
- 2.3.3 ASME Y14.36M Surface Texture Symbols (1996, R 2002).
- 2.3.4 ASME B46.1 - 2002 Surface Texture, Surface Roughness, Waviness and Lay.
- 2.3.5 AS71051B Pipe Threads, Taper, Aeronautical National Form, Symbol ANPT – Design and Inspection Standard.
- 2.3.6 AS568C Aerospace Size Standard for O-rings.
- 2.3.7 CGA C-6-2005, Standards for Visual Inspection of Steel Compressed Gas Cylinders, Compressed Gas Association.
- 2.3.8 CGA C-6.2, Guidelines for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders, Compressed Gas Association.
- 2.3.9 MIL-STD-413C Visual Inspection Guide for Rubber Elastomeric O-Rings.
- 2.3.10 Rubber Manufacturers Association (RMA) Rubber Handbook RMA MO-1 (2005).
- 2.3.11 The Plastics Industry Trade Association SPI/SPE AR-106 Mold Finish Guide.
- 2.3.12 SAE AS9103 Variation Management of Key Characteristics

3 Workmanship

3.1 Machined Parts

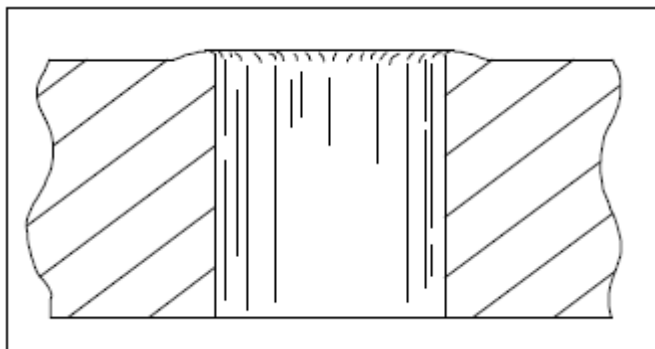
3.1.1 Burr and Edge Terminology

- 3.1.1.1 *Burr – a non-functional piece of material extending from the parent surface of a part. A burr can be a sharp, ragged projection, firmly adhered, or a loosely hanging projection.*

3.1.1.2 Burr Related Terms and Types –

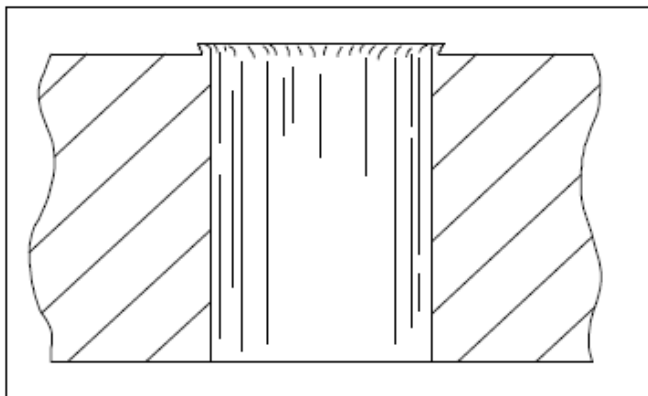
- 3.1.1.2.1 **Extruded Burr** - readily seen raised material generally caused by the drilling of a malleable material. This type of burr does NOT exhibit evidence of material that can break away. See Figure 1 for pictorial example. ACCEPTABLE

Figure 1



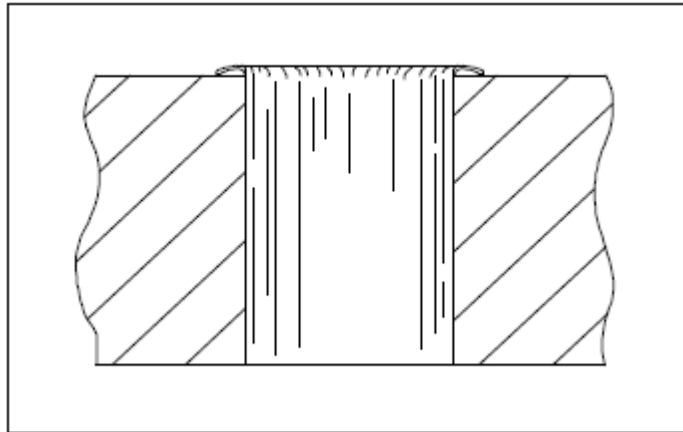
- 3.1.1.2.2 **Feathered Burr**- loose burr generally found on an edge where two dissimilar surface finishes meet. See Figure 2 for pictorial example. Acceptability to be determined, by “brush & blow” method (Ref. 5.1.1.3)

Figure 2



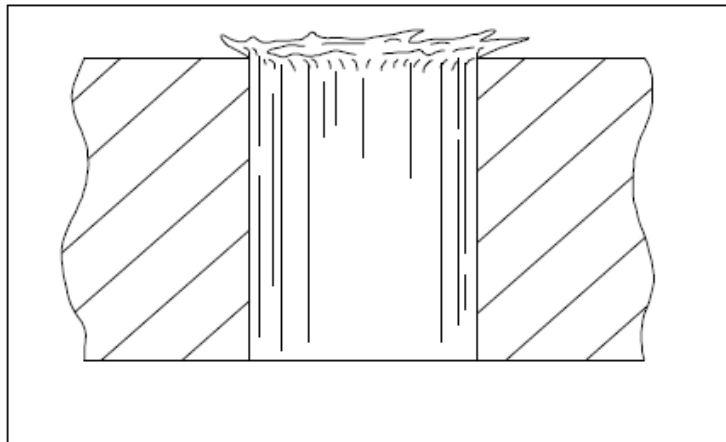
- 3.1.1.2.3 **Doughnut Burr** - a loose piece of rolled material that tends to flatten and blend itself into the adjacent material. See Figure 3 for pictorial example. UNACCEPTABLE

Figure 3



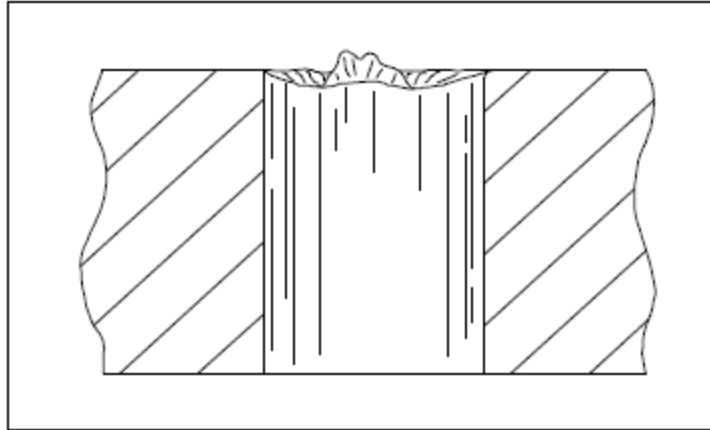
- 3.1.1.2.4 **Sliver Burr** - loose sliver of material attached to the edge of a feature. This type of burr generally forms on edges adjacent to a milled or turned surface. See Figure 4 for pictorial example. UNACCEPTABLE

Figure 4



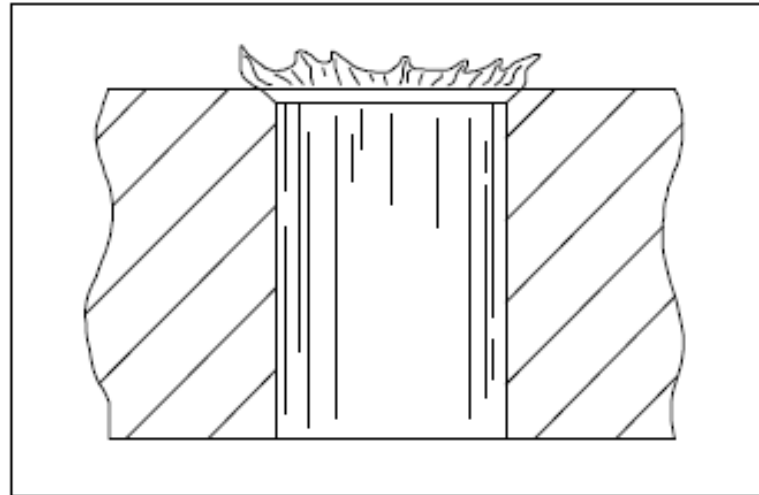
- 3.1.1.2.5 **Hinged Burr**- loose material typically formed in holes and features located on surfaces that have been milled. See Figure 5 for pictorial example. UNACCEPTABLE

Figure 5



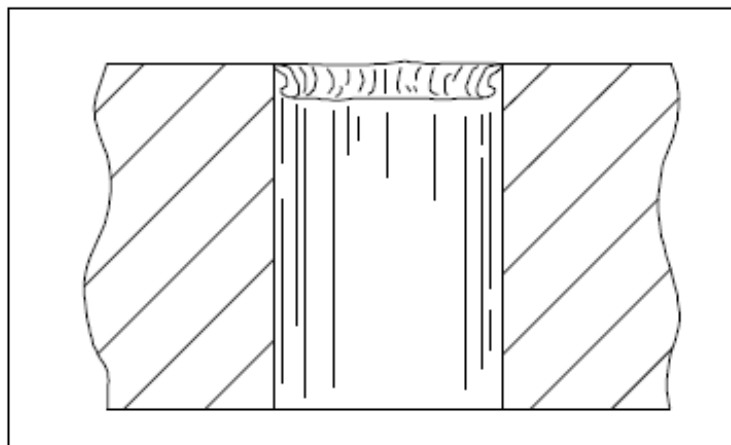
- 3.1.1.2.6 **Crowned Burr**- loosely attached material typically formed around a hole that has been countersunk. See Figure 6 for pictorial example. **UNACCEPTABLE**

Figure 6



- 3.1.1.2.7 **Rolled Burr**- Similar to a hinged burr, this type of burr forms in holes and features that are located on surfaces that have been milled or turned See Figure 7 for pictorial example. **UNACCEPTABLE**

Figure 7

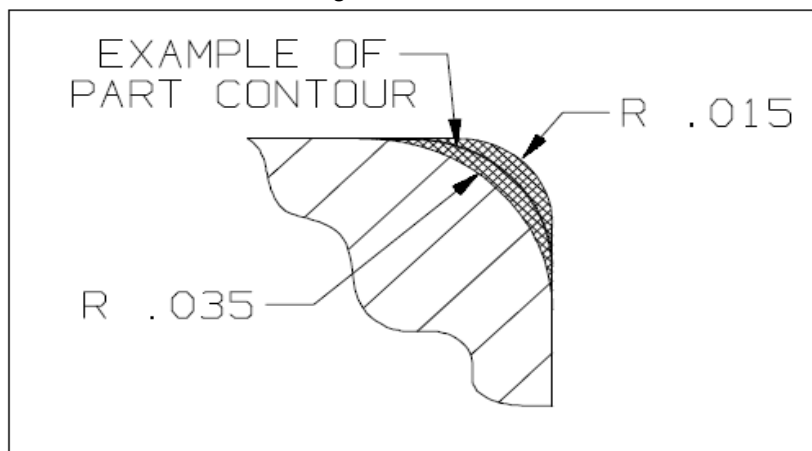


3.1.1.3 Chamfer – a machined inclined surface cut at an edge.

3.1.1.4 Corner – the intersection of three or more edges.

3.1.1.5 CR .XXX (Controlled radius) - Any size radius that falls between the smallest and the largest radius allowed by the stated tolerance. Note: the part contour must be a fair curve with no reversals. Additionally, radii taken at all points on the part contour shall neither be smaller than the specified minimum limit nor larger than the maximum limit.

3.1.1.5.1 Example: CR .025± .010 - A fair curve with no reversals that lies within the shaded region shown below:



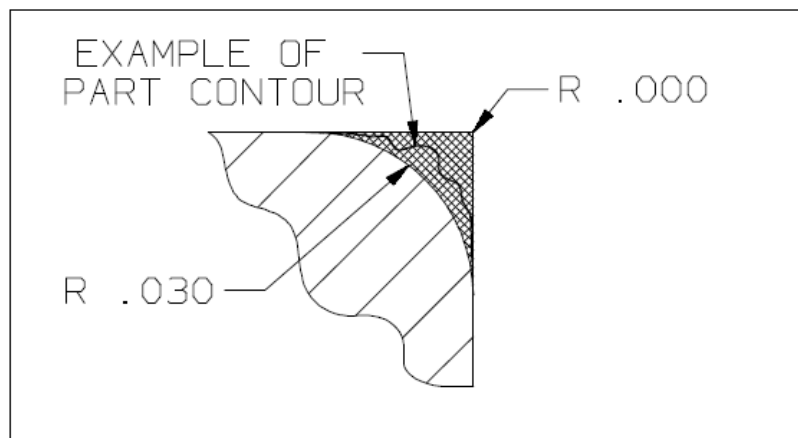
3.1.1.6 *C/R (Chamfer/Radius) - Any combination of angles or radii that fall inside an area formed by the largest chamfer and the smallest radius as allowed by the stated tolerance.*

3.1.1.7 *Edge – the intersection of two surfaces.*

3.1.1.8 *Edge Break – the amount of material removed the theoretical intersection of two surfaces. An edge break is typically identified as a uniform chamfer or radius.*

3.1.1.9 *R.XXX Max. - any combination of angles and radii that fall between a .000" radius and the specified maximum radius.*

3.1.1.9.1 *Example: R .030 Max- Any combination of angles and radii that fall within the shaded area illustrated below:*



3.1.1.10 *R.XXX ±.xxx. - Any combination of angles and radii that fall between the smallest and largest radius allowed by the stated tolerance.*

3.1.1.11 *Secondary Burr - Often after a primary de-burring operation such as countersinking or chamfering, a small burr will be generated at the intersection of the countersink or chamfer surfaces and the original part surfaces. Acceptability to be determined, by the "brush & blow" method (Ref. 5.1.1.3).*

3.1.1.12 *Sharp Edges – edges that can readily cut or tear. To clearly illustrate what is meant, the following three classes of sharp edges are defined:*

- Class 1: for thin materials (.010" thick or less), a burr-free edge with a radius, chamfer, or edge break less than $t/10$, where t is the material thickness.
- Class 2: for materials (greater than .010" thick), a burr-free edge with a radius, chamfer, or edge break less or equal to 0.001".

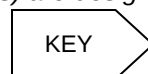
- Class 3: for normal commercial use, any edge that would cut hands, containers, or nearby components in normal handling. Sharp edges in this class include burr-laden edges as well as burr free edges that can cut.

3.2 Burr / Edge Requirements

- 3.2.1.1 *All burrs including feathered, doughnut, sliver, hinged, crowned, and rolled burrs shall be removed to a C/R .015" max unless otherwise specified on the engineering drawing.*
- 3.2.1.2 *Any external sharp edges will be removed to a C/R .015" max unless otherwise specified on the engineering drawing.*
- 3.2.1.3 *All print tolerances and finish requirements must be maintained **AFTER** de-burring is completed.*

4 ENGINEERING

- 4.1.1.1 *Drawings will conform to the requirements set forth **by** this specification.*
- 4.1.1.2 *Parts will be de-burred to conform to the requirements set forth in this specification.*
- 4.1.1.3 *Parts will be accepted / rejected based on the requirements set forth in this specification.*
- 4.1.1.4 *In areas where further machining, at a subsequent part number (next level), will remove any burrs that may be generated, a note stating "BURRS ALLOWED IN THIS AREA" will be added to the drawing. This area will be outlined with phantom lines to control its boundaries.*
- 4.1.1.5 *If the default inspection classes as stated in SECTION 5 are not acceptable the engineering drawing shall also state the acceptable class of inspection.*
- 4.1.1.6 *In the case of aluminum parts requiring anodized finishes, the engineering drawing shall call-out specific area(s) where anodize rack contact will be permissible. Within these specified areas, craters, scratches, and indentations will be acceptable so long as all deformed material appears plastically deformed (extruded burr), cannot be dislodged with an air blast or nylon bristle brush (ref. 5.1.1.3) and the feature's dimensional characteristics meet the engineering drawing.*
- 4.1.1.7 *Key Characteristic(s) are designated on AVOX drawings with the following symbol:*



Variation management activities must be performed until the process (es) that influence the characteristics are in control and process

capability (>1.67 CPK) has been established. Appropriate monitoring is then implemented to assure continued performance.

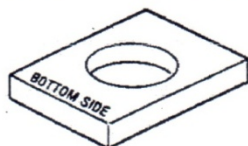
5 INSPECTION

5.1 Inspection Classes

- 5.1.1.1 *Parts for use in oxygen and external to assembly (Class I) - Inspect part with the naked eye.*
- 5.1.1.2 *Parts for use in oxygen and internal to assembly (Class II) - Inspect part using 8X magnification.*
- 5.1.1.3 *Parts for use in non-oxygen products – (Class I) - Inspect part with the naked eye.*
 - *Note: If, for either of the Classes I or II above, a defect is visible but not identifiable, then an increase in magnification to the next higher magnification is permissible.*
 - *If there is doubt as to the acceptability of a burr, the burr shall be evaluated as follows, if the burr cannot be moved or dislodged with an air blast (approx. 90 psi shop air) or nylon bristle brush, the burr will be determined to be acceptable. This method is commonly referred to “brush and blow”.*

Direction of Viewing

Frequently, easily detectable burrs may be overlooked when viewing a part from an single direction. It is good practice to view components from varying directions and angles when inspecting for burrs. In general, parts should not be viewed looking straight down but should be viewed with the line of sight between 30° to 60° to the edge or surface being inspected.



Burr may not be visible when viewed from one side only.



Burr may be apparent when viewed from one side only.

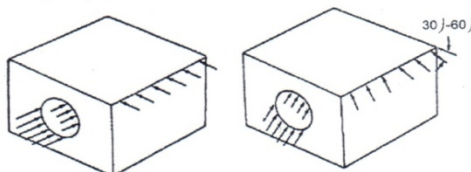


Varying the viewing angle aids in detecting burrs.

Importance of Direction of View

Proper Lighting

Accurate visual interpretation of burrs requires proper and sufficient lighting. Similar to the line-of-sight viewing of workpieces, lighting should also be at an angle of 30° to 60° to the surface being inspected. Intensity, type, color and angle of lighting used, shall be mainly dictated by the size, shape, material and detail of the workpiece.



Poor Lighting Angles

Preferred Lighting Angles

Lighting Angles

Surface Texture

- 5.1.1.4 *Surface roughness, waviness, and lay characteristics shall conform to ANSI/ASME B46.1. Components and assemblies must comply with the finish requirements specified on the engineering drawing.*
- 5.1.1.5 *Engineering drawing practices will comply with ANSI/ASME Y14.36M-1996 which establishes the method to designate symbolic controls for surface texture. Drawings will specify a default surface texture value (located in the drawing title block) and also any further refinement of the surface texture must be specified on the field of the drawing (noting critical sealing regions, lay symbols, etc.).*

5.2 Threads

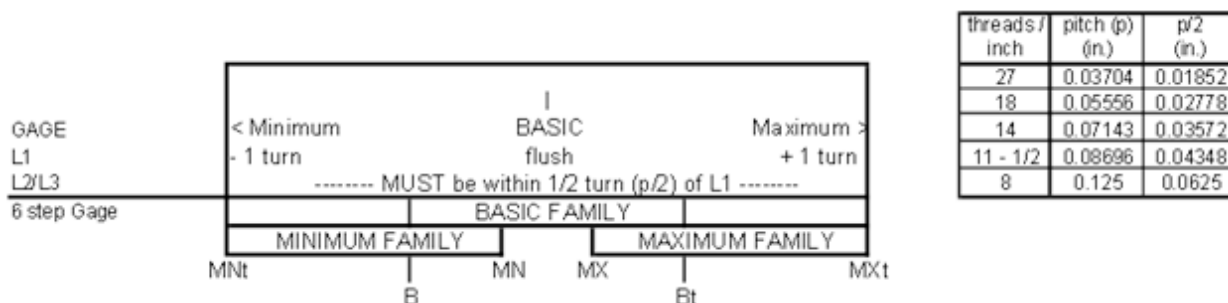
- 5.2.1 All threads not specified to the UN standard to be a Class 2A for external and Class 2B for internal threads.

-
- 5.2.2 All thread relief angles to be $45^{\circ} \pm 5^{\circ}$ unless otherwise specified on drawing.
- 5.2.3 Threaded Fasteners (including male threaded components/features):
- 5.2.3.1 *The threaded portion of fasteners must gage correctly with regards to pitch, major and minor diameter (i.e. go/no gage, referee gaging 3-wire method). Loose hanging burrs as defined in sec. 3.1.1, if it cannot be dislodged by air-blast or contact with a nylon bristle brush, will be acceptable.*
- 5.2.3.2 *The head area of fasteners must gage correctly with reference to size. Loose hanging burrs as defined in sec. 3.1.1, which if cannot be dislodged during its intended use, or by air-blast or contact with a nylon bristle brush, will be acceptable.*
- 5.2.4 Blind tapped holes will be acceptable with sheared burrs or rolled cusps generated from the tapping operation at the crest or minor diameter of the thread so long as this material is firmly enough attached so that a compressed airblast from a nozzle small enough to enter the blind hole to its bottom will not dislodge this material. Likewise, a slight raised appearance where the first thread intersects the countersink at the entrance to the hole will be acceptable if it cannot be dislodged by air-blast or contact with a nylon bristle brush (ref. 5.1.1.3). In all cases the tapped hole must gage properly with the appropriate plug gages. Form or roll tapping is an acceptable practice for any internally threaded feature. This same criteria will apply to through tapped holes; any additional controls desired on through tapped holes will appear on the engineering drawing.

5.2.5 ANPT Threads:

5.2.5.1 *Pipe Threads, Taper, Aeronautical National Form, ANPT: are to meet the requirements of SAE AS 71051B, with the following modification, unless the drawing specifies otherwise.*

- *The thread family class will be as follows:*
 - o *External (Male) threads – Basic family to minimum family.*
 - o *Internal (Female) threads – Basic family to maximum family.*



5.3 Drilled Holes

5.3.1 If noted on an AVOX engineering drawing, a feature of size (circular) specifies: Drill (example: *Drill .096" thru*). The drilled hole tolerances unless otherwise specified on the blueprint are per EO 1000-180:

Drill Size	Tolerance
0.0135" thru 0.125"	+0.004" / -0.001"
0.126" thru 0.250"	+0.005" / -0.001"
0.251" thru 0.500"	+0.006" / -0.001"
0.501" thru 0.750"	+0.008" / -0.001"
0.751" thru 1.000"	+0.010" / -0.001"
1.001" thru 2.000"	+0.012" / -0.001"

5.4 Hexagonal Shapes (Hex)

- 5.4.1 If noted on an AVOX engineering drawing, a hexagonal feature of size specifies: HEX (example: Hex 9/16" or 0.625" Hex), the hexagonal size default tolerances are in accordance with AVOX MSP No. 15 unless otherwise specified on the blueprint:

AVOX MSP No.15 Hex Size (inch)	Tolerance (inch)	
	Plus	Minus
0.001 - 0.150	0.000	0.005
0.151 - 0.500	0.000	0.006
0.501 - 1.000	0.000	0.008
1.001 - 2.000	0.000	0.010

6 CYLINDERS

6.1 Steel Cylinders

- 6.1.1 DOT Ratings: 3AA-1800, 3AA-2100, or 3HT-1850
- 6.1.2 Inspection Criteria: CGA C-6-2005, Standards for Visual Inspection of Steel Compressed Gas Cylinders, Compressed Gas Association.

6.2 Composite Cylinders

- 6.2.1 DOT Ratings: DOT-E8162-1850, TC-SU 4237-127, or DOT-E8391-1850
- 6.2.2 Inspection Criteria: CGA C-6.2, Guidelines for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders, Compressed Gas Association.
- 6.2.3 Note: Variations in shape of cylinder bases – Composite cylinders are manufactured by fiber reinforcement of a metal liner. The fiber reinforcement is built up by filament winding and as such the shape of the cylinder base can vary depending on the winding pattern or design characteristics. Figure 8 shows examples of the typical variation that is possible. The cylinder on the left has not been deformed by pressure but is exhibiting a more pointed shape due to the winding process.

Figure 8: Variations in Shape of Composite Cylinder Bases (acceptable condition)



Source: Luxfer Carbon Composite Cylinders "INSPECTION MANUAL 2009".

7 RUBBER and PLASTIC MOLDED COMPONENTS

7.1 Rubber Parts

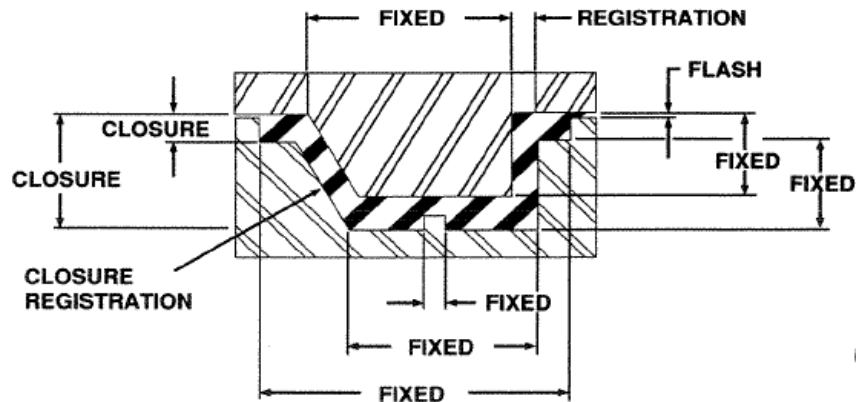
7.1.1 Reference RMA MO-1 (2005) and AVOX SMP 7600001.

7.1.2 Dimension Terminology

7.1.2.1 *The following will provide a common terminology for use in discussing dimensions of molded rubber products, and for distinguishing various tolerance groupings:*

7.1.2.1.1 *Fixed Dimension: Dimensions not affected by flash thickness variation. (Mold Closure)*

7.1.2.1.2 *Closure Dimensions: Dimensions affected by flash thickness variation. (Mold Closure)*



7.1.2.2 "A3" - tolerances indicate a "commercial" product and will be used for all molded rubber products, and for distinguishing various tolerance groupings unless specified differently on the engineering drawing.

7.1.3 Machined Finish of Mold

7.1.3.1 "F3" is "Commercial Finish. Surfaces of the mold will conform to good machine shop practice and no micro-inch finish will be specified. This will be the default unless specified differently on the engineering drawing.

7.1.4 Flash

7.1.4.1 Flash is excess rubber on a molded product. It results from cavity overflow and is common to most molding operations. Flash has two dimensions - Extension and Thickness.

7.1.4.2 Flash Extension - is the film of rubber projecting from the part along the parting line of the mold. Flash Thickness - is measured perpendicular to the mold parting line. Variations in flash thickness are normally included in closure tolerances

7.1.4.3 The designer may indicate on his drawing any amount of maximum flash extension permissible. Reference RMA MO-1 for designation specifics.

7.2 O-Rings

7.2.1 **Dimensional Specifications:** Aerospace Standard (AS) 568 "Aerospace Size Standard for O-rings" contains specifications for inner diameter and cross-section diameter, as well as parting line height and projection.

7.2.2 **Surface Quality/Inspections Specifications:** Military Standard MIL STD 413 C is the standard for O-rings standard imperfection classifications.

7.2.2.1 *Includes illustrations and supplementary definitions and dimensions to identify O-ring surface imperfections for "the purpose of inspection, and*

7.2.2.2 *Establishes quantitative levels of acceptance for O-rings relative to surface imperfections, type, size, and quantity.*

7.3 Plastic Molded Components

7.3.1 Verify that parts being inspected are from the same material and molding lot. Material certification shall be supplied by supplier/molder.

7.3.2 Inspect parts to the requirements of the drawing and the inspection characteristics sheets.

7.3.3 Carefully inspect component for signs of crazing and cracking.

7.3.4 The presence of existing cracks and/or material de-laminations shall be cause for rejection.

7.3.5 Molding knit lines and/or material flow lines shall not be a cause for rejection unless they result in a discontinuity in a critical area or degrade the structural integrity of the part.

7.3.6 Engineering drawings should specify surface finish using Society of the Plastics Industry (SPI) standard surface finish definitions.

S.P.I. Mold Finishes	Roughness Average (R.A.)		Root Means Square (R.M.S.)	
	Micrometers (μm)	Microinches (μin)	Micrometers (μm)	Microinches (μin)
A-1	0.012	0.5	0.013	0.5
	0.025	1.0	0.027	1.1
A-2	0.05	2.0	0.055	2.2
A-3/ B-1	0.10	4.0	0.11	4.4
	0.15	6.0	0.18	7.2
B-2	0.20	8.0	0.22	8.8
B-3	0.25	10.00	0.27	10.8
C-1	0.3	12.0	0.33	13.2

Figure 9: SPI Mold Finish & Corresponding Surface Roughness

8 External Drawing Specifications/Standards

8.1.1 When the Engineering Drawing contains a specification, standard or other reference number which is superseded, cancelled, obsolete, or discontinued:

8.1.1.1 Supersession Information – when the specification/standard cancellation notice lists a specific replacement document utilize the equivalent replacement specification. This paper trail facilitates the procurement of material or other products to the appropriate follow-on standard.

8.1.1.2 Cancelled Information – when a specification has been declared “CANCELLED” or “OBSOLETE” and has been superseded, the requirements of the latest issue of the replacement specification is accepted.

8.1.1.3 Discontinued – when the specification has been discontinued or cancelled without replacement, contact AVOX Engineering or Supplier Quality for the appropriate specification or standard to utilize.

9 Cleanliness and Packaging

- 9.1.1 Prior to stocking and/or prior to returning parts to AVOX Systems, all parts are to be free of process related material (i.e. chips, coolant, bead blast material, deburring media, etc).
- 9.1.2 Packaging codes are specified on the Purchase order after the QA requirement codes (e.g. VS/A). All parts and/or assemblies shall be packaged in accordance with all applicable drawings, specifications and special packaging instructions. If specific packaging instructions are not imposed, the best commercial packaging practices must be used to prevent damage. Packaging codes are specified on the Purchase Order after the QA requirement codes (e.g. VS/A ; note : "VS" is for AVOX internal use only)
- Code A – If Code A is specified on the PO, parts must be individually packaged.
 - Code B – If Code B is specified, the items have shelf life limitations (Refer to document SQAR S_0002W_QA).
 - Code C – If Code C is specified, the items may be packaged in bulk.

CLASS CODE	PROTECTION REQUIRED AGAINST:	APPROPRIATE & ADEQUATE MEASURES OF PROTECTION FROM THIS COLUMN
A	- Thread damage - Part damage - Surface finish damage - Surface abrasion - Distortion or warpage - Internal contamination - External corrosion and/or contamination Hermetic sealed packages	Caplugs (male or female) Carton separators Layer separators Individual bags, boxes, racks or wrapping Lubricant film Skin pack Peel coat
B	- Extremes in temperature - Dampness and high humidity - Shelf Life	Off floor racks (A or B) Store in area not adversely affected by extreme heat or cold and having a relatively low and stable humidity. Separate by lots of parts (in boxes or bags) clearly identified with cure date. In original packaging
C	General Item: Off-the-shelf purchases, standard parts or line items which do not require any protection other than best Stock Room practices of orderly storage with proper identification.	

Protection Code B items (shelf life items) require an additional protection code, either an A or C. Examples of codes on the Material Acceptance Tag would be B/A or B/C.

10 Textiles

10.1.1 EEBD material

10.1.1.1 Class "A" and Class "B" variances

10.1.1.1.1 Consists of yarn discolorations in the fabric weave termed "floats", "bunched", or "slubs" conditions. Such conditions may appear singly, or in combination with each other.

10.1.1.1.2 The weaving process occasionally produces a fabric construction containing "Floats, whereas several yarns may extend over and under several filling yarns in a misweave, yet continue to provide flash protection.

10.1.1.1.3 Samples shown are typical of these conditions and are acceptable within prescribed allowances.



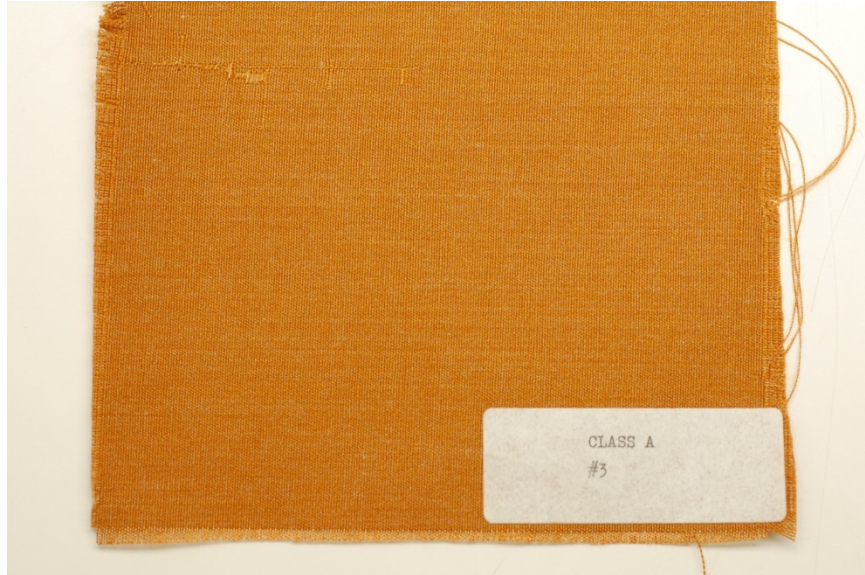
Class A, #1 Floats (Acceptable as shown)

1. Acceptable if less than ½ square inch in area per occurrence
2. Acceptable if no more than 2 per side above apron – total 4 per hood
3. Acceptable if no more than 1 per side on apron – total of 2 per hood
4. NOTE: In all cases (floats) must be relatively tight to assure functional integrity



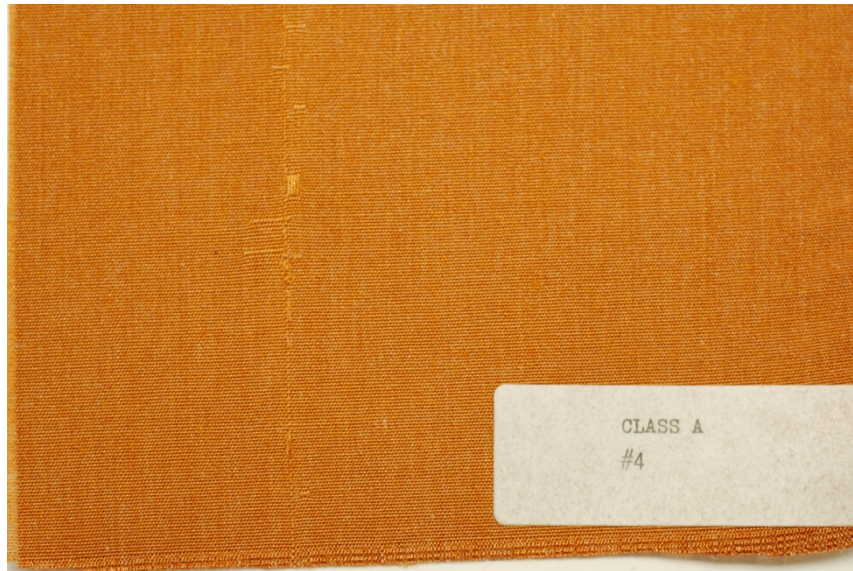
Class A, #2 Floats (Acceptable as shown)

1. Acceptable if less than ½ square inch in area per occurrence
2. Acceptable if no more than 2 per side above apron – total 4 per hood
3. Acceptable if no more than 1 per side on apron – total of 2 per hood
4. NOTE: In all cases (floats) must be relatively tight to assure functional integrity



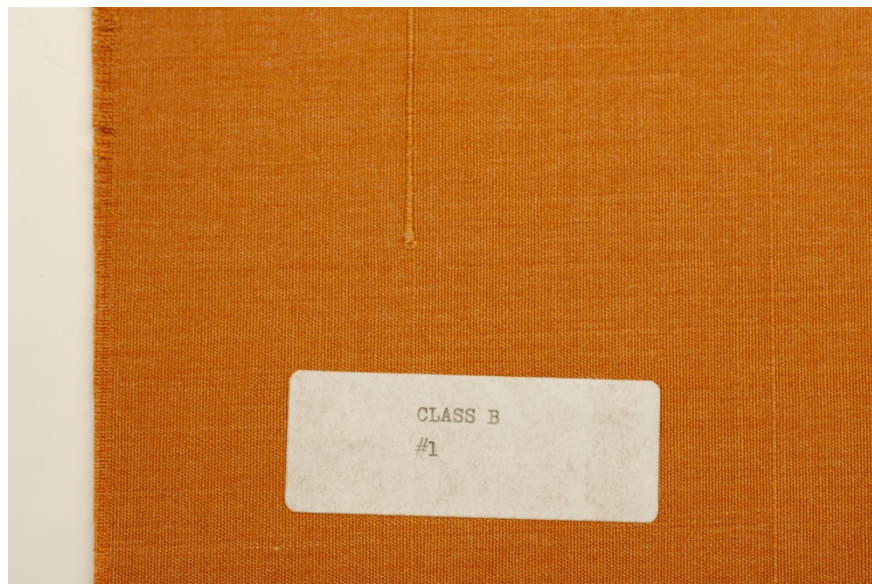
Class A, #3, Floats, bunched or slubs combinations (acceptable as shown)

1. Acceptable if meeting criteria of A1 and A2
2. Acceptable if meeting criteria of B1 and B2



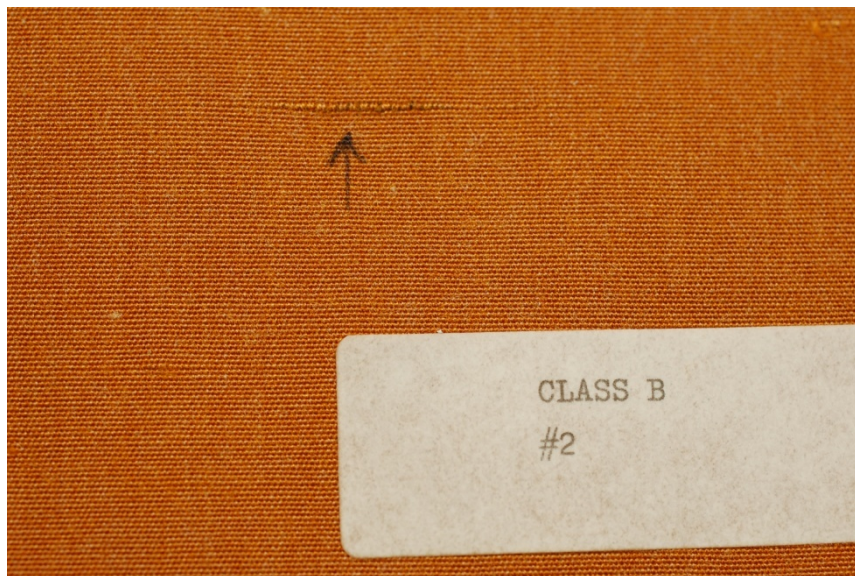
Class A, #4, Floats, bunched or slubs combinations (acceptable as shown)

1. Acceptable if meeting criteria of A1 and A2
2. Acceptable if meeting criteria of B1 and B2



Class B, #1 Bunched, Slub, Broken(acceptable as shown)

1. Acceptable if length is less than 6 inches and width is less than 1/16th of an inch.
Maximum allowed – 2 per side – total of 4 per hood



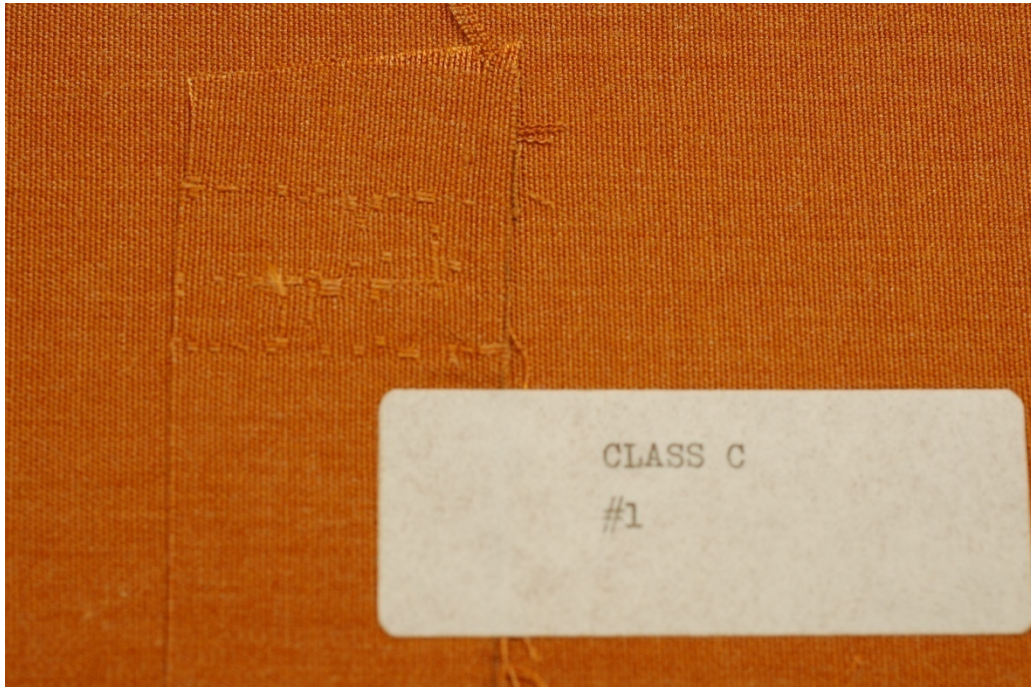
Class B, #2 Bunched, Slub, Broken(acceptable as shown)

2. Acceptable if length is less than 4 inches and width is less than 1/8th of an inch.
Maximum allowed – 1 per side – total of 2 per hood

10.1.1.2 Class "C" variances

10.1.1.2.1 Consists of yarn breaks, interruptions and ruptures in the fabric which are superficial and do not affect structural integrity of the fabric construction.

10.1.1.2.2 Samples shown are typical of these conditions and are acceptable within prescribed allowances



Class C, #1 Broken P/C (acceptable as shown)

1. Acceptable if not exceeding 4 square inches per occurrence. Maximum allowed – 1 per side above apron. Total of 2 per hood. Maximum allowed – 1 per side on apron. Total of 2 per hood.



Class C, #2 Fuzz Ball (Acceptable as shown)

1. Acceptable if not exceeding 5 per hood

10.1.1.3 Class "D" variances

10.1.1.3.1 Consists of irregularities and locally loose construction involving a few yarns and are known as floats and loops

10.1.1.3.2 Samples shown are typical of these conditions and are acceptable within prescribed allowances.



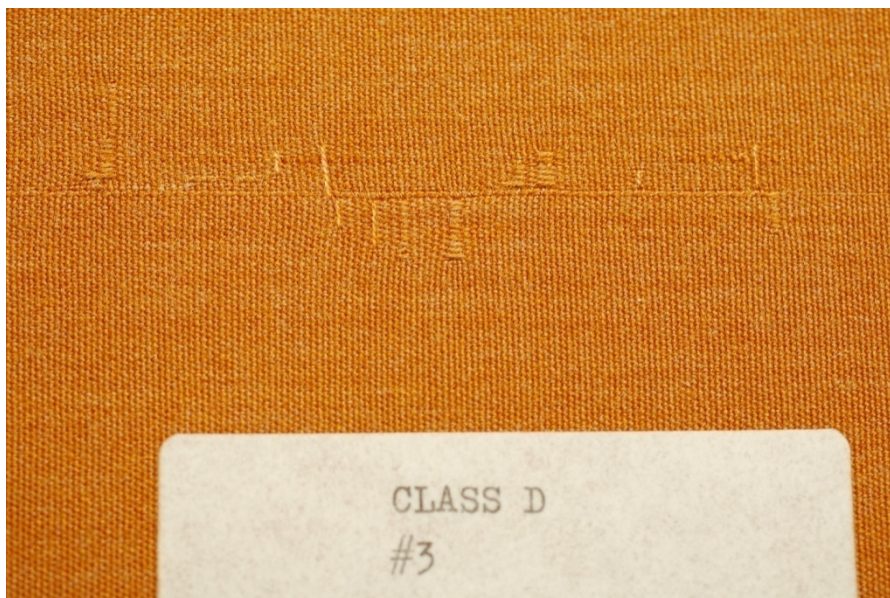
Class D, #1 Floats and loops (acceptable as shown)

1. Acceptable if not exceeding 4 inches in length or 2 square inches per occurrence.
Maximum – 1 per side. Total of 2 per hood



Class D, #2 Floats and loops (acceptable as shown)

1. Acceptable if not exceeding 4 inches in length or 4 square inches per occurrence.
Maximum – 1 per side. Total of 2 per hood



Class D, #3 Floats and loops (acceptable as shown)

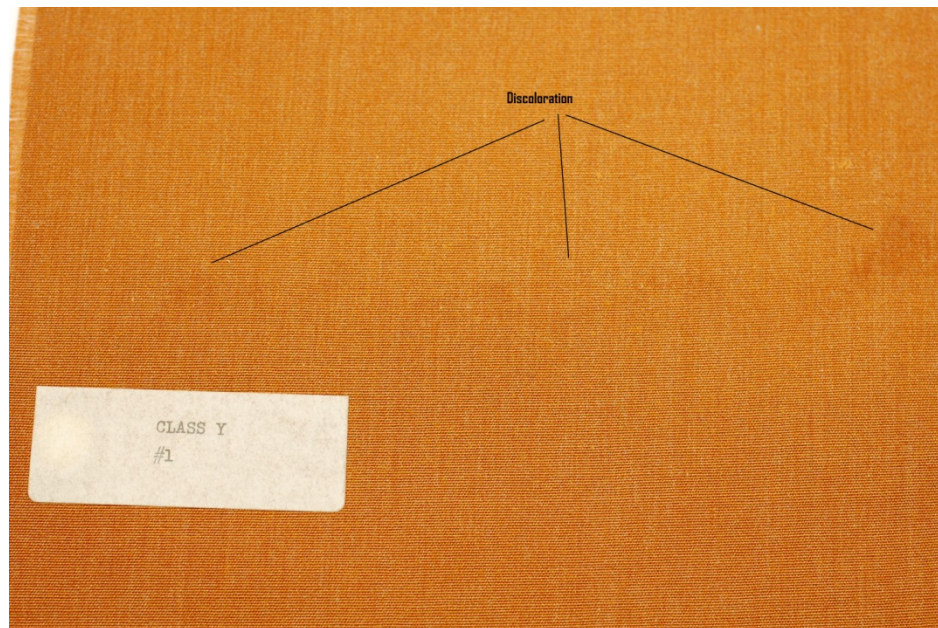
1. Acceptable if not exceeding 4 inches in length or 4 square inches per occurrence.
Maximum – 1 per side. Total of 2 per hood

10.1.1.4 Class "Y" variances

10.1.1.4.1 Consists of sudden color or hue changes on fabric, identification markings or change in fabric color contrast due to adhesives or residues from contact tape.

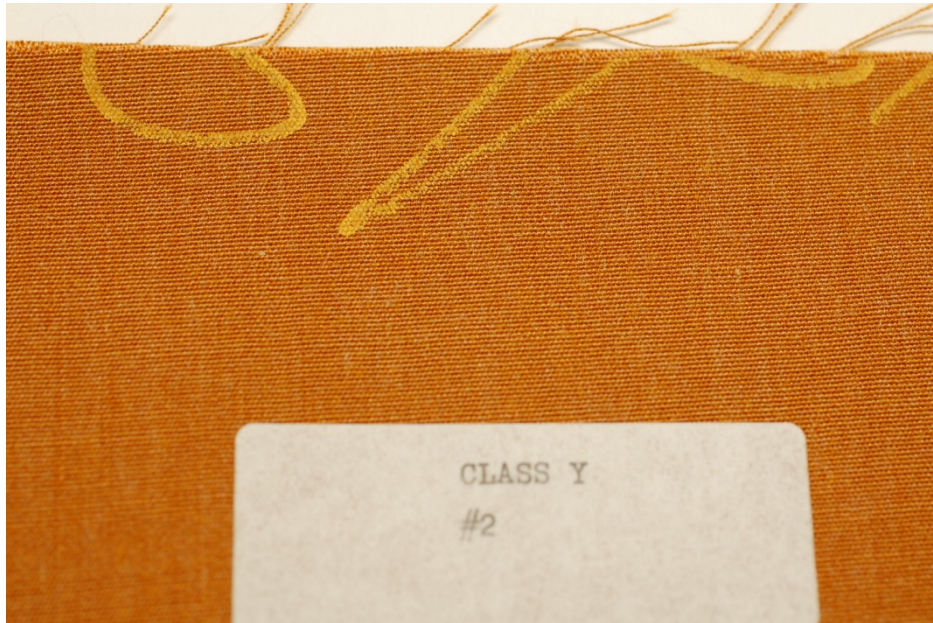
10.1.1.4.2 Samples shown are representative of non-acceptable variances. Hoods exhibiting one or more of these conditions are to be rejected

NOTE: Condition Y #1 may be acceptable if no worse than the sample in the master material sample book



Class Y, #1 Stains (acceptable as shown)

1. Not Acceptable Tone or hue change is more subtle than shown in photograph. Photo may have been enhanced for contrast.



Class Y, #2 Markings (acceptable as shown)

1. Not Acceptable



Class Y, #3 Stamping

1. Not Acceptable



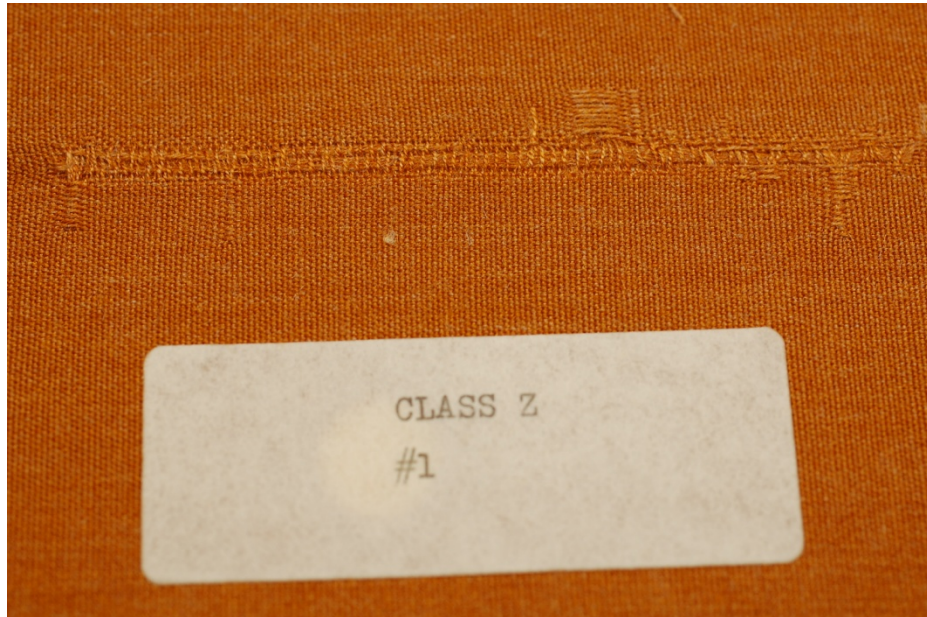
Class Y, #3 Tape Mark

1. Not Acceptable

10.1.1.5 *Class "Z" variances*

10.1.1.5.1 Consists of extensive yarn discolorations which compromise structural integrity of the fabric.

10.1.1.5.2 Samples shown are not acceptable



Class Z, #1 Extensive Dislocation

1. Not Acceptable



Class Z, #2 Extensive Dislocation

1. Not Acceptable



Class Z, #3 Extensive Dislocation

1. Not Acceptable



Class Z, #4 Extensive Dislocation

1. Not Acceptable

10.1.2 JSAM Duck cloth (Bags, pouches, pockets) and general standards

10.1.2.1 Seam Edges – All the seam edges shall be specified distance from edge of fabric (as called out on part drawing). Seams shall not be twisted or pleated, and no parts shall be caught in an unrelated operation or seam

10.1.2.2 Thread breaks and ends of seams – All thread ends shall be trimmed to a maximum of ¼ inch.

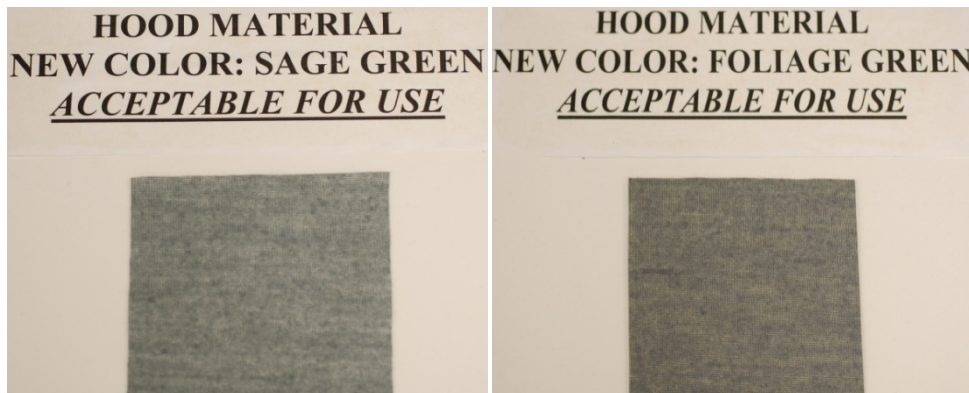
10.1.2.3 Sewing – Each row of stitching shall be straight and parallel to the seam edge. Thread breaks, skips, and run-offs shall be over stitched not less than 1 inch. The thread tension shall be maintained to prevent loose or overly tight stitching.

10.1.2.4 Repairs – Repairs to type 301 stitching are allowed. Loose or excessively tight stitching shall be repaired by removing the defective stitching without damaging the materials and restitching as required in the applicable drawing. Needle holes resulting from removed stitching do not constitute damage to the material.

10.1.2.5 Markings – All item markings shall be in accordance with the applicable drawing requirements. There shall be no smears or smudging on the label on the label that causes the identification to not be easily legible with the unaided examination by untrained personnel.

10.1.3 JSAM Nomex (MPU-6 hood material)

10.1.3.1 Color JSAM Nomex material





10.1.3.2 Seams All the seam edges shall be specified distance from edge of fabric (as called out on part drawing). Seams shall not be twisted or pleated, and no parts shall be caught in an unrelated operation or seam

10.1.3.3 Seam taping / sealing: Tape edges peeling are not acceptable



10.1.3.3.1 Pleats, puckers: NO pleats or puckers allowed in the seam sealing tape

10.1.4 JSAM polyester (MPU-5 hood material)

10.1.4.1 Color: Color to be in accordance with W.L. Gore P/N KPDX605103

10.1.4.2 Seams All the seam edges shall be specified distance from edge of fabric (as called out on part drawing). Seams shall not be twisted or pleated, and no parts shall be caught in an unrelated operation or seam

10.1.4.3 Seam taping / sealing: Tape edges peeling are not acceptable



10.1.4.3.1 Pleats, puckers NO pleats or puckers allowed in the seam
sealing tape

10.1.4.3.2 Scorched surface: Scorched surfaces on the material or the tape are not acceptable



11 Forgings and Cast Components (Reference AMS2175)

- 11.1.1 Visual inspection shall be performed in areas with ambient lighting.
- 11.1.2 Visual inspection of forgings and castings shall be performed. The forging finished surface shall be free of foreign materials, and shall not contain cracks, hot tears, cold shuts, and negative core seams (parting line below flush). In addition, castings shall conform to the criteria specified on the engineering drawing, when viewed with the unaided eye at a distance of 24 inches.
- 11.1.3 Surface roughness shall conform to the engineering drawing requirements. Surface roughness requirements specified on the engineering drawing (e.g., 63 Ra, 125 RMS, etc.)
- 11.1.4 Gate, Riser, and Parting Line Projections if allowance limits are not specified on the engineering drawing, then the maximum limit for gates, risers and parting lines shall be 0.031" for non-machined and 0.062" for machined surfaces.
- 11.1.5 For investment and permanent mold castings, random raised metal shall be limited to a height of 0.015" to 0.030" in an area 0.125" x 0.125" and no more than 1 per square inch. Random surface pits shall be limited to Ø 0.030" to 0.070" inch (or equivalent surface area) and 0.030" in depth and no more than 1 per square inch if larger than the minimum allowable diameter. Surface pits less than 0.030" deep or raised metal less than 0.015" in height may be present.
- 11.1.6 The leak tightness test is a non-destructive test which shall be applied when a pressure test is required for a cast part. The leak tightness test is appropriate only if there are pressure test requirements per the component drawing or to verify the integrity of a cast component part which will be pressurized in service.

12 Springs

- 12.1.1 Springs specified to have ends square and ground, may have a maximum open coil end, ½ wire diameter.
- 12.1.2 Squared and ground ends: Unless otherwise specified on the drawing or (MS), squared and ground ends of compressions springs shall have a bearing surface between (minimum 250°) two-thirds and three-quarters, of the mean circumference (240° - 270°) of the spring. The ends shall be squared by closing down the end coil and subsequently grinding to obtain the bearing surface; or by one of the following methods followed by closing down the end coil and subsequently grinding.
- 12.1.3 The thickness of the tip of the end coil after grinding shall not exceed one-half of the original diameter of the material. Unless otherwise specified, the thickness of the tip shall not be reduced to less than one-eighth of the wire diameter. The sides and corners of the tip shall be broken with all sharp edges and loose burrs removed

(reference 3.1.1.12).

13 Painted and Powder Coated Parts

- 13.1.1 Applies to AVOX painted and powder coater parts and assemblies except for oxygen cylinders.
- 13.1.2 Painted surfaces must be clean and free of defaults such as inclusions, scratches, cracks...etc. prior to components being painted.

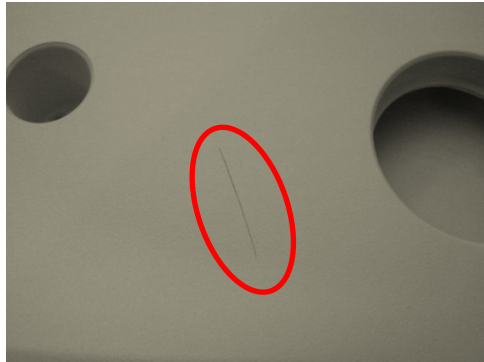
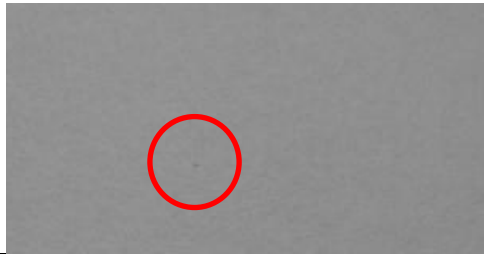
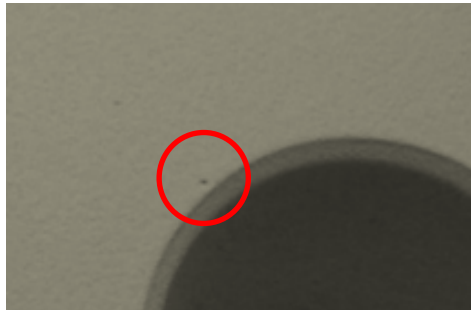
13.2 Visual Inspection

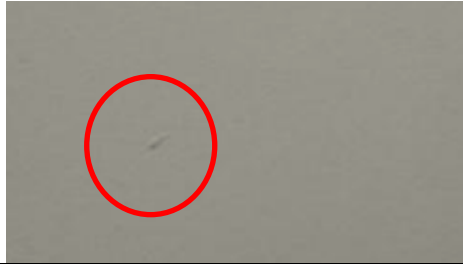
13.2.1 This control is applicable at the supplier's final inspection before packaging, and at ZODIAC AVOX SYSTEMS receiving inspection. Inspection should be performed with the unaided eye at a distance of 24 inches.

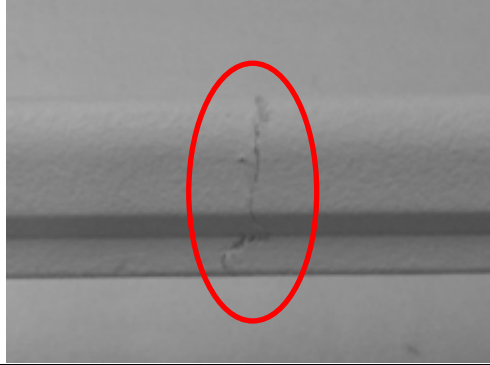
13.2.2 The inspection room shall be adequately lighted with a suggested light distance approximately 3 ft (1 m) from the part to be inspected.

13.2.3 Check following items:

- The aspect, texture, color, and gloss on the painted surface is to be checked in comparison with reference plaques, in accordance with Fed-Std-595 (or applicable finish specifications noted on the component or assembly drawing).
- Area to be controlled by the paint or powder coating is defined on the component drawing.
- Inspection criteria are defined in following table:

ITEM NUMBER	TYPE OF DEFECT	EXAMPLE	ACCEPTANCE CRITERIA
1	Scratch (long marks, bumps...)		Not acceptable whatever the default width
ITEM NUMBER	TYPE OF DEFECT	EXAMPLE	ACCEPTANCE CRITERIA
2	Black point (cannot be removed by blowing)		See appendix 1
3	Bubble		See appendix 1
4	Paint drips or runs		Not acceptable

5	Inclusion (cannot be removed by blowing)		Not acceptable
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ITEM NUMBER	TYPE OF DEFECT	EXAMPLE	ACCEPTANCE CRITERIA
6	Foreign particles or film adhering to painted surface (which cannot be removed by blowing with air).		Not acceptable
8	Cracks		Not acceptable
9	Web cracks		Not acceptable
11	Pen, pencil, or marker (not identified on the drawing)		Not acceptable

ITEM NUMBER	TYPE OF DEFECT	EXAMPLE	ACCEPTANCE CRITERIA
12	Ribbed texture		Not acceptable
13	Fingerprint marks		Not acceptable
14	Reworked painted surfaces		Acceptable if not detectable

APPENDIX 1

- Acceptance criteria for small defects:

Defect size	Acceptable quantity/part	Minimum distance between 2 defects
<0.25 mm (0.98")	any	150 mm (5.9")
0.26 mm < X < 0.4 mm 0.01" < X < 0.16 "	3	200 mm (7.9")
0.41mm < X < 0.5 mm 0.16 " < X < 0.02 "	1	250 mm (9.8")

14 Chrome Plated Parts

14.1.1 This section of the standard covers the visual requirements for electrodeposited chromium plating. This section applies to AVOX chrome plated parts and assemblies.

14.1.1.1 An example of the Finish note on detail drawing for chrome plated component is below:

FINISH: CHROME PLATE PER SAE-AMS-2460, TYPE II, CLASS 2, (.00001" TO .00007" THICK) ON SURFACES INDICATED.

14.1.2 Plating of AVOX components is typically applied as a decorative finish, to improve corrosion resistance (fluid susceptibility), eliminate the occurrence of a tarnish oxide layer on bare copper alloys, and also to increase wear resistance, but usage is not limited to such applications.

14.2 Visual Inspection

14.2.1 Electrodeposited chromium plating shall be compliant to both the class and appearance (luster) as specified on the component drawing.

14.2.2 This control is applicable at the supplier's final inspection before packaging, and at ZODIAC AVOX SYSTEMS receiving inspection. Inspection should be performed with the unaided eye at a distance of 24 inches.

14.2.3 The Plating, as received by purchaser, shall be smooth, continuous, adherent, free from delamination within the plating, uniform in appearance, fine grained, and shall be free from blisters, nodules, excessive pits, and other imperfections detrimental to usage of the plate. Slight staining or discoloration is permissible. The plating shall show no indication of contamination or improper processing such as excessively powdered or darkened plating, excessive edge build up, or other defects (Reference 3.5 of AMS 2460).

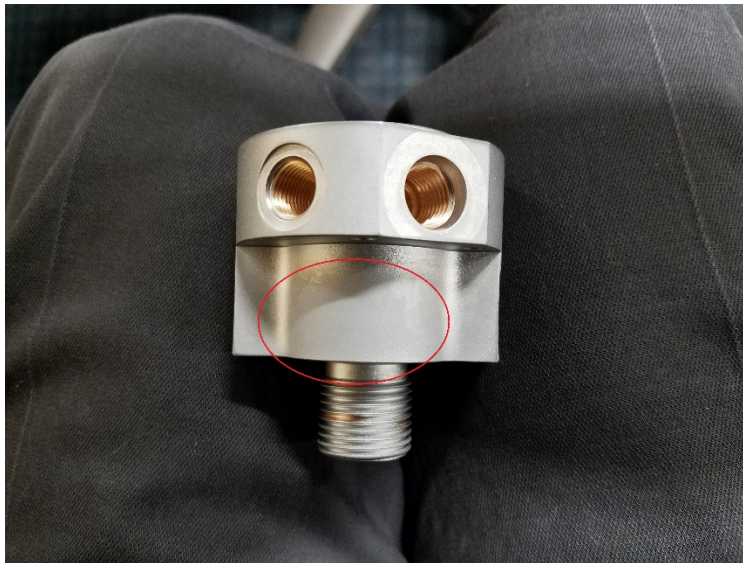
14.2.4 The inspection area shall be adequately lighted with a suggested light distance approximately 3 ft (1 m) from the part to be inspected.

14.2.5 Examples of chrome plating inspection criteria are defined in following photographs:

Photograph illustrating: Darkened non-uniform plating



Photograph illustrating: Powdery, non-uniform, and grainy plating



Photograph illustrating: Non-uniform in appearance



Photograph illustrating: Excessive edge build up

